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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

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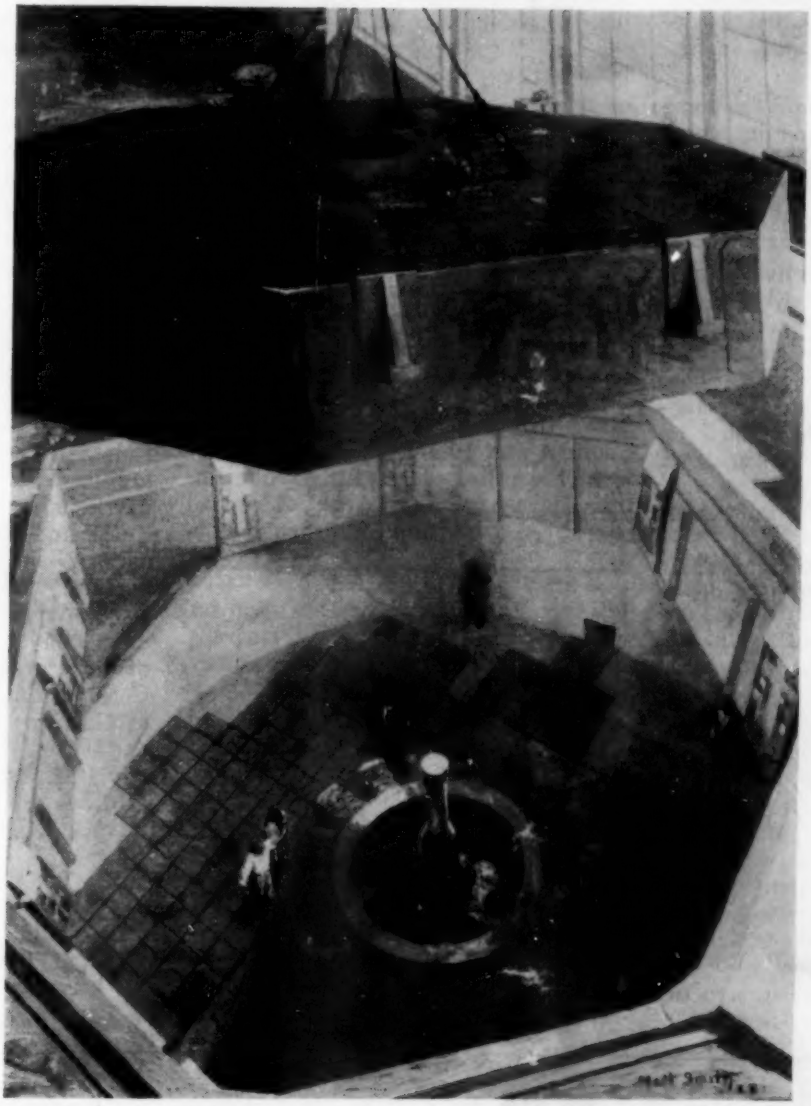

LEARNING BY BREAKING

Overspeed Tests Given in Concrete Pit

(See page 118)

Vol. XVI No. 437

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Aid Requested for Quake Observations

Seismology

Public cooperation in reporting effects of local earthquakes is requested by the U. S. Coast and Geodetic Survey and the Division of Geology and Geography of the National Research Council. If every person who feels even a mild quake would report to the Survey, in Washington, the work of the scientists would be greatly aided. In particular, they want observations of the earthquake felt in New York and neighboring states on Monday, August 12. While this quake was recorded by seismograph instruments at various observatories, these are rather sparsely scattered, and many quakes, on which information is desired, are not recorded on any instruments.

What is needed especially is some knowledge of the direction in which the earth and the things on it seemed to move, and the general intensity of the shocks. This can be judged from such points as these:

Did the buildings jar or tremble, or did dishes or windows rattle?

Did chairs or lightly balanced things, like lamps or potted plants, rock back and forth?

Did doors, lamps, or hanging things swing? If so, in what direction?

Did heavy articles, like tables, stoves or beds, move?

Were there any cracks in plaster walls?

Did bricks fall from chimneys?

Were there any cracks in walls or foundations of buildings?

Were there any shocks after the main one?

At what time did the shock occur?

The information thus collected will be used for many purposes. The measurement of intensity of earthquakes and the correct outlining of the areas where they occur is one of the chief uses. But it will also be valuable in furnishing statistics on earthquakes for for the use of insurance companies, facts for the use of engineers and architects and association of earthquakes with the geological structure of the region where they occur.

Science Service and its associated newspapers are cooperating in this work by describing the needs of the Survey and by publishing a questionnaire giving the information wanted by the earthquake students. For several years Science Service has cooperated with the Coast and Geodetic Survey and the Jesuit Seismological Association in gathering earthquake records from a number of seismograph stations, and thus promptly reporting the exact location of severe earthquakes in all parts of the world.

Such methods of gathering earthquake information have been used before to advantage, especially in the case of the St. Lawrence quake on February 28, 1925. A representative of the Geological Survey, Dr. Arthur Keith, now chairman of the National Research Council's Division of Geology and Geography, visited the affected regions and secured much material by personal interviews.

An interesting sidelight was found in the way in which different groups responded to the questions. The descendants of the old New England stock regard moderation and absolute truth as objects of respect, and to them the giving of help to a public inquiry was an inherited duty. They could be relied upon to give cool, impartial statements because they had preserved their calm even though startled by their first great earthquake. In strong contrast were the French Canadians, of rather recent immigration, with whom reticence is not a leading characteristic and whose desire to tell a good story and give the hearer his money's worth seemed to lead some of them rather far afield. The Italian fruit dealers who flourish in all the good-sized towns were excellent sources of evidence. Earthquakes meant little to these people, for they were old stories to them in Italy. They gave ready and matter-of-fact accounts, provided the inquirer could convince them that what they said in such a government investigation would not be used against them. The Greeks were the most irresponsive, and the cold shoulders that they turned upon the Federal scientist spoke volumes as to their views on governmental inquiry.

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Quake Near Buffalo

Seismology

The earthquake which shook most of New York and parts of neighboring states on Monday, August 12, was centered near Attica, New York, at 42 degrees 55 minutes north latitude and 78 degrees 20 minutes west longitude. This was determined by earthquake experts of the U. S. Coast and Geodetic Survey with the aid of data gathered by Science Service. The quake was recorded by seismograph instruments at Georgetown University and the U. S. Bureau of Standards, Washington; the U. S. Coast and Geodetic Survey's station at Chicago; the University of Michigan, Ann Arbor; St. Louis University, St. Louis, and the Dominion Observatory, Ottawa, Canada.

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An important new lighthouse has been built on a coral island in the Philippines to guide shipping in transit between Hong Kong, Manila, and Australia.

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"Thinking Machine" Aims Guns

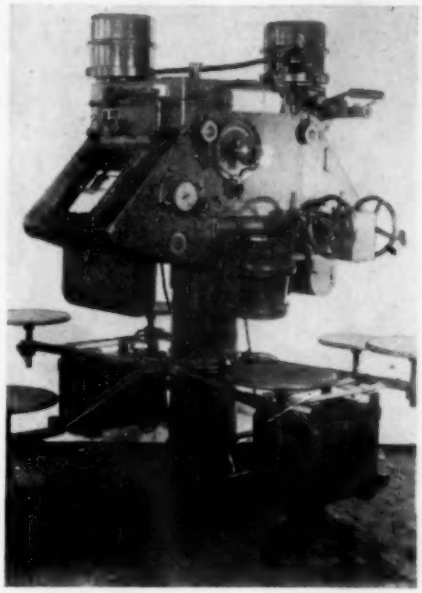
Aviation—Ordnance

By Frank Thone

Robots are the order of the day. Every week or so we read about some new ingenious automatic mechanism, built to do anything from dancing on the vaudeville stage to operating the machinery of a million-kilowatt power station. Some of them, of course, are mere stunt performers, but the majority are hard-working robots, doing an honest day's work in return for their lodging and the ration of electric "juice" that is their only food. Many complicated jobs have been turned over to these machines that can almost think, or that at least have had all their thinking done for them in advance by the engineers and inventors, and their conduct determined for all time by lines graven in tablets of brass.

The art of war now has its robots no less than the activities of peace. Engineers and inventors in the service of the ordnance department of the U. S. Army have evolved many devices that take over a lot of the pencil and paper work that would have to be done in a hurry under fire should war ever come to us again. Having no judgment of their own, these military robots never make mistakes—are never off by a fatal misplacement of a decimal point. And often they can solve in seconds a problem that would take a man "good at figures" many trying minutes, thereby enabling troops to move, or a battery to open fire, when those few minutes mean all the difference between success and disaster.

Perhaps the most amazing "thinking machine" that has yet made its appearance in Army circles is the new fire-direction instrument for anti-aircraft artillery. This device, manned by a few trained operators, can turn its telescopic eyes on a distant airplane and within thirty seconds automatically train on it a battery of high-angle guns, that will harry it with a hurricane of steel and TNT hurled accurately upwards at the rate of a ton a minute. The cannoneers serving their pieces may be half a mile from the eyes that aim the guns for them. They need not even see their target or know what it is; they may be hidden in the deep woods or blanketed under fog or a smoke screen. All they need do is hold the noses of their shells in the fuse-setters for a moment, then slam them into the guns and pull the lanyards. And miles away, and thousands of feet up in the air, some bombing plane, against which they are defending a city or a dockyard or a canal, is going to be in difficulties. It is not well to let an Army robot get too good a look at you.



THE THINKING MACHINE that automatically directs the fire of any number of guns

Like most highly successful things, this new fire-control instrument has been given credit for more than it can actually perform. One legend that gained considerable circulation was that it automatically picked up the sound of an approaching plane, trained the guns on it, and opened fire, all without the touch of a human hand. That is a little too much of a good thing; although one Army officer has prophesied that eventually it will be possible to train a similar instrument on the plane by sound instead of by sight, thereby eliminating the necessity for cumbersome and conspicuous searchlights at night. But even if this comes to pass at all, it is still in the future; and even then the instrument would still require human operators.

The sober facts about the new fire-direction instrument are these: The machine has two telescopic objectives. Both of these are kept trained on the target by operators, one following horizontal movement and the other all changes in vertical position. These two components are combined by means of suitable gears within the instrument, to give a definite direction setting, which can be transmitted to the guns. Other operators, manipulating control dials, feed into the machine other necessary data, such as the range and altitude of the target, the allowances needed for wind and barometric pressure, etc. Corrections for these factors are automatically made.

The setting arrived at by the instrument is transmitted to the gun position by electric cable. Here a synchronous motor mounted on each gun translates the instrumental data into movements of the gun carriage, keeping the muzzle of the piece trained always on the target, with just enough "lead" so that when it is fired the shell will arrive and burst at a designated spot at exactly the same second that the enemy plane arrives there. And since the danger zone around a bursting three-inch shell is about fifty yards in diameter the arrival of fifty or sixty of these messengers in about a quarter of a minute is apt to be somewhat embarrassing for the visiting bomber, to say the least. The command of one fire-direction instrument may, if desired, be extended over several batteries instead of only one.

At the option of the battery commander, this automatic direction of the guns can be cut out, and the pieces handled in the old way, either following the pointer on a dial automatically controlled from the fire-direction instrument, or receiving the data from the range-finding station by telephone. Such a reversion to earlier methods, however, would probably be resorted to only in emergency.

For night defense against bombing raids, sound-locating instruments and searchlights have to be brought into play, before the fire-direction instrument can begin its work. It is probably some confused notion about the function of the sound-locating instrument that has given rise to the legend about the ability of the new fire-direction instrument to shoot "by ear." The sound-locator, which looks like a group of four huge loud-speaker horns, searches the suspected sky at night, and gets the approximate location of the approaching plane. (*Turn to next page*)

"Thinking Machine" Aims Guns—*Continued*

Then the searchlights, to which elevation and azimuth have been electrically transmitted, whip out into the darkness and presently hold the plane in their unrelenting tentacles. It is notoriously hard for a bombing plane to escape from the beam of a searchlight. Once made visible, the plane is picked up by the telescopes of the fire-direction instrument, and in thirty seconds the guns begin to bark. But day or night, the target must be seen before it can be fired upon; the automatic finding and shooting by sound only is still a myth.

The guns that obey the commands that the Army robot sends out along his electric nerve trunks are a far cry from the crude "archies" of world war days. These first anti-aircraft guns were for the most part merely adapted field pieces—French 75's and similar guns cocked up at a high angle on more or less improvised mounts. These could not hold the guns steady under their own recoil, so that each piece had to be laid anew after each shot. The breech-blocks, moreover, were designed for more or less horizontal positions, and made loading at a high angle awkward and slow.

In the new guns all this has been changed. The mounts are rock-steady, so that shell after shell can be put into exactly the same spot even at long range. The breech-locks are designed with an eye especially to loading at any angle up to the vertical; they are also semi-automatic, snapping shut of themselves as the base of the cartridge enters the breech.

An especially efficient mount for mobile anti-aircraft guns has only lately been added to the armory of the newer "archie." The old mounts, on rubber-tired trucks or trailers, had too small a base to be at all steady. The new mount consists of four long, spider-leg girders that spraddle out flat on the ground, with the gun platform at the point where they come together. On this arrangement the guns can sit even on soft soil, and blaze away all day, as accurately as if they were on concrete bases. The legs have hinged joints in them, so that the mount can be folded up compactly, lifted on its wheeled road carriage, and be "ready to roll" in a few minutes. The fire-direction instrument rides on its separate carriage, and a truck-mounted power plant supplies the necessary current for the operation of the battery.

The guns for which these mounts have been designed are also great improvements over the war-time anti-aircraft ordnance. They are a great deal longer in proportion to their caliber; this makes for longer range and higher velocity. The ordnance department designers have also devised a new method by which a gun can have its liner, or inner tube, changed in the field. The liner is the part of a gun that gets the heaviest punishment, especially in pieces that are fired with the rapidity demanded in anti-aircraft work, and the necessity of sending the whole gun back to the arsenal periodically for relining has been one of the big troubles of the "archies". Now the job can be done in an hour in the field that used to require several weeks on the crowded arsenal floor.

The standard gun that has been adopted for both field and fortification work is a three-inch piece, throwing a 15-pound shell to a height of 10,000 yards, with an extreme horizontal range of 15,000 yards. A rate of fire of about 30 shots per minute per gun has been attained with this weapon. This means that a battery of four can hurl at a plane nearly a ton of steel and high explosives in a burst of fire lasting one minute.

The three-inch anti-aircraft cannon has a formidable big brother in the new 105-millimeter, or 4.1-inch, high-angle rifle, a very long-barreled, powerful weapon, that can throw its 33-pound projectile to a height of 12,000 yards and an extreme range of 19,000 yards, or over ten miles. It is a slower speaking piece than the three-inch, firing only 15 times a minute, but the greater weight and range of the projectile, together with the larger danger zone created by its explosion, more than even up the score.

FOUR 50-CALIBER MACHINE GUNS on one mount, can fire 30 shots a second

Because of the great length and considerable weight of the fixed ammunition for this gun, the operations of loading and of ejecting the empty cartridge case after firing have been made almost entirely automatic. The long cartridge, weighing 45 pounds, is laid in a tray extending backward from the breech, and a pneumatic rammer shoves it home. As it clears the breech-lock, the projecting rim at its base trips a trigger, which allows the spring-pulled block to slide up into place and finish seating the cartridge. The gun is now ready to fire. When it is fired, the force of the recoil is utilized by means of an ingenious cam arrangement to open the breech and empty cartridge case, and also to return the pneumatic rammer to compression position, ready to load another charge into the chamber.

The ammunition used in these two guns represents a great advance over that used during the war. Then, because of the unreliability of time fuses, shrapnel was usually employed. This type of projectile fills the air with a shower of leaden pellets, shot-gun fashion, and is an excellent means of attack upon infantry or other scattered targets. But it isn't so good against a narrow target like an airplane, for it was practically necessary to score a hit on the aviator himself in order to bring down the plane.

Nowadays high-explosive shell is used, for post-war development in time fuses has made it possible to make sure of bursts within fifty yards of the target. At this distance the aviator is exposed not only to the flying splinters but the stunning concussion caused by the explosion, which may cause him to lose control of his plane for a few fatal seconds.

A third gun which has been developed for anti-aircraft work is perhaps the most vicious seeming of the whole family when it is seen in operation, though it is only a little one. This is the 37-millimeter rifle, an automatic. It fires shells weighing about one pound at the rate of a hundred per gun per minute. During night firing, when tracer ammunition is used, the trajectory can be seen drawn against the dark sky like a fiery dotted line.

The light shells of this gun differ from those of its larger brothers in that they are designed to burst on contact instead of by a time fuse. That is, a shell must actually hit a plane before it can (*Turn to next page*)

Calls Typhus American Disease

Pathology

North America has developed its own special brand of typhus fever, the Old World scourge that still takes terrific toll of life among the lower classes of Russia.

Dr. Kenneth F. Maxcy of the U. S. Public Health Service has found that a mild form of typhus fever is endemic, that is, occurs repeatedly from time to time, in certain states in the south, notably Georgia, Alabama, North Carolina, Virginia and Florida. In this region it appears to be identical with tarbardillo, the typhus that bobs up with uncomfortable frequency south of the Rio Grande and sometimes above it.

It differs from Old World typhus in that most of the cases occur in summer and fall instead of spring and winter, and in its relatively low mortality.

Contrary to expectation, native white Americans of respectable station have been the principal victims, while negroes remained almost unaffected. An occupational analysis showed that a large percentage of the cases were from among people engaged in handling foods, such as groceries, meats, produce and feed. This circumstance has led to the formulation of the theory that rats or mice act as reservoirs of the disease from which man is accidentally infected by bites of some bloodsucking parasite.

One of the tests that have been developed to help identify this disease, for many of the early cases were confused with other maladies, has recently been found to give a positive reaction for Rocky Mountain spotted fever, a disease of the typhus group, but immunologically distinct.

"'The typhus," said Dr. Moxcy, "which has been occurring in our eastern seaports does not depend upon direct importation from across the sea. It belongs to the North American Continent."

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"Thinking Machine" Aims Guns—*Continued*

explode. But when it does, the effect is ruinous. Half a wing, or the whole of the rudder apparatus simply vanishes. So much has been determined by trial on fabric targets, but what would happen should one of these little shells chance to hit a loaded bomb rack had better be left to the imagination.

In addition to these guns that attack with shell, the Army has turned its attention to the possibilities of machine guns. These should be especially useful against low-flying planes that "strafe" infantry and transport columns with machine-gun fire and light bombs. Some of the newer planes designed for this kind of fighting carry light armor about the cockpit, to protect the crew and vital machinery from ordinary fire. To answer this argument, the .50-caliber machine gun has been developed. It is the same in general construction as the .30-caliber Browning heavy machine gun, but it throws a massive cigar-shaped bullet, half an inch in diameter and weighing two ounces. The light plates an airplane is able to carry cannot deny entrance to such messengers as these. And in order to get a high concentration of fire, four of these pieces are placed on the same mount. With such a battery one gunner can direct a veritable hurricane of fire—thirty shots a second.

Both the 37-millimeter automatic and the multiple-mounted machine guns can be handled by means of the new five-direction instrument, to as great advantage as their larger relatives, the 3-inch and the 4.1-inch. In fact, the Army's robot may branch out and make itself useful to the field artillery as well as to the "archies". One problem that has not yet been solved by the field guns is the rapidly moving tank. They cannot follow it fast enough. But, say the anti-aircraft ordnance officers, if we can score hits on a bombing plane flying at 100 miles an hour and having three dimensions to shift around in, it would surely be a much simpler job to score a hit on a tank moving ten or twenty miles an hour, and for all practical purposes limited to movement in two dimensions. In case this fire-direction instrument, or some modification of it, does demonstrate an ability to find the troublesome tank, these new-born military dinosaurs are going to have a harder time of it than they had in the World War. For a direct hit with a 75 or 155-millimeter shell will put out of action the biggest tank going, and it would be impracticable to add armor thick enough to stop such projectiles. It will be a most curious development if a weapon designed for use against hawks should prove useful also against armadilloes.

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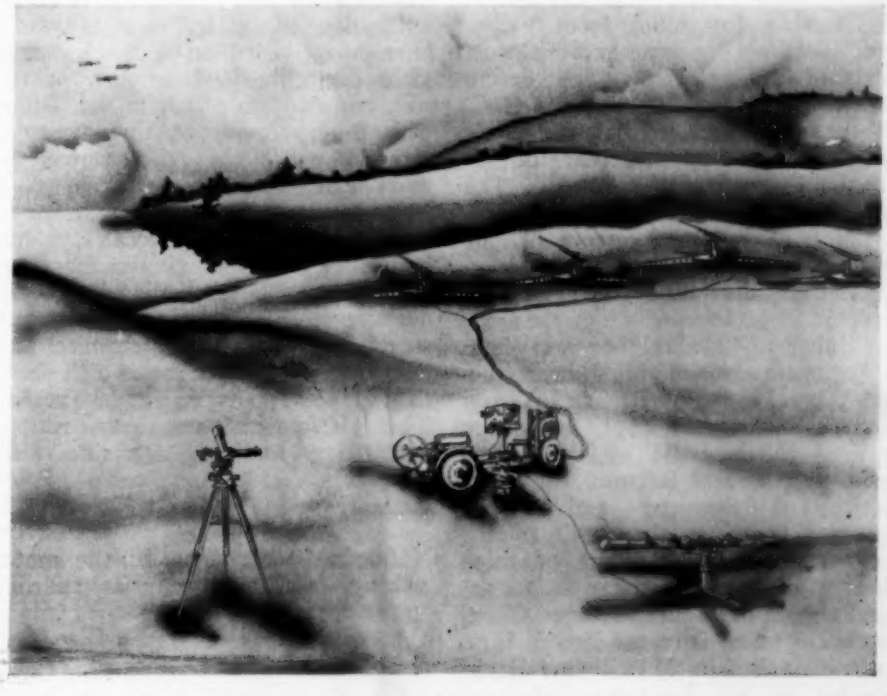

DIAGRAM OF THE NEW RECEPTION COMMITTEE for enemy aircraft. The "thinking machine" is on the trailer in the foreground

Radio Waves Penetrate Rock

Physics

Radio waves of the frequency used for broadcasting are capable of passing through at least 300 feet of rock, such as limestone and sandstone. This is the conclusion drawn by Dr. A. S. Eve, professor of physics at McGill University, following tests that he made in Mammoth Cave, Kentucky. The experiments were performed in collaboration with D. A. Keys and F. W. Lee, under the joint auspices of the U. S. Bureau of Mines and the Geological Survey of Canada. They are described in a report to *Nature*.

Prof. Eve had made previous experiments in the Mt. Royal tunnel at Montreal. He found that the broadcast waves could be heard throughout the entire three and one-half mile length of the tunnel, but short waves, of about 40 meters' length could not be detected more than a few hundred feet from the tunnel's mouth.

The problem then was to find out how the waves entered the tunnel. One idea was that they penetrated the rock, another was that they came in through the entrance, while a third theory proposed that they were carried along the rails and wires. Prof. Eve believes that all three paths are available, but it was desirable to try the experiment under conditions which would eliminate some of these possibilities.

Mammoth Cave proved an ideal location for such tests, as it contains no wiring or other continuous conductors, and the tortuous passages effectually seal off the entrances.

When a super heterodyne receiver, equipped with a loop aerial, was taken into the cave under Mammoth Dome, words and music were received from Louisville, Nashville and Cincinnati, with 75 feet of rock, mostly sandstone, above. With a 300-foot aerial, coupled to the loop of the set, the signals were received with 300 feet of rock above.

With longer waves transmiting code the signals were also heard through 300 feet of rock, though the static was too great to permit accurate measurements of intensity. As the waves appeared to travel in a horizontal direction, they apparently passed through the rock, rather than down from above.

Then a coil of wire 100 feet in diameter was laid on the ground above and excited by an oscillating current. These waves were detected 300 feet below. Frequencies of 20 and 30 kilocyles were much louder than those between 40 and 100 kilocycles. Very long waves of half a kilocycle were detected without an amplifier through 900 feet of rock. Such tests as these are important because of the use of similar methods for finding ore deposits.

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Glozel Alphabet Called Fraud

Archaeology

A new climax has developed in the Glozel affair, the scientific controversy which has set leading archæologists of Europe by the ears for the last five years.

Pottery, implements and clay tablets unearthed in 1924 by a peasant named Emile Fradin near the hamlet of Glozel a few miles from Vichy, were identified by some authorities as relics of the new stone age, dating back roughly some 10,000 years B. C. Others boldly declared that the whole thing was a fraud and that the so-called relics had been "planted". The tablets were covered with crude hieroglyphics, alleged predecessors of our own alphabet, according to pro-Glozelians, thus antedating the commonly accepted Phoenician origin of the modern alphabet by several thousand years.

Argument waxed high over this and other points of departure from accepted archæological knowledge brought to an issue by the Glozel finds, and several lawsuits for defamation of character and similar charges ensued as the result of the controversy. To clear one of these charges of fraud, a judge in an arrondisement of Moulins ordered Glozel specimens taken from the Fradin farm to be examined by M. Edmond Bayle, director of the laboratory of legal identification.

After a careful analysis it was found from the condition of micro-organisms, incorporated in the clay of one of the tablets, that it could never have been baked. Since it had never been baked it could not have survived long in the soil. In fact, one of the pieces, according to a report of the investigation, after being subjected to slow infiltration of water, such as would have taken place on a much larger scale during a long sojourn in the soil, crumbled to pieces in the hands. This is good evidence, the investigators feel, that the relics cannot be more than five or six years old.

To forestall the inevitable storm of protest from Glozel advocates, it has been suggested that all the more active participants on both sides of the question select their own specimens and submit them to a public chemical and microscopic analysis at which both they and their adversaries be present. Then the results must necessarily be accepted as final by both sides once and for all.

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About 10 per cent. of the motor vehicle fatalities occur at railroad grade crossings.

A large number of forceps, probes, and other tools used by surgeons more than 2,000 years ago were found in the ruins of Pompeii.

Brains Resist Starvation

Physiology

The brain of an animal suffering from a lack of vitamins resists this particular type of starvation more successfully than the rest of the body. This is indicated by experiments reported by Dr. J. Mosoyni of Budapest, speaking before the Thirteenth International Physiological Congress.

Dr. Mosonyi selected three groups of white rats as the subjects of his experiment. He gave one group an ordinary diet, with neither excess nor lack of vitamins. A second group got a ration as near zero in vitamin content as can be devised, while the third received a considerable excess in vitamins.

At the end of the experimental period the brains were weighed. There was no notable difference in the brain weight. This is taken to indicate that an excess of vitamins does not make for any notable increase in total brain size, and that in animals whose bodies are rendered subnormal by vitamin starvation the brains are still able to grow to normal size.

Although the excess-vitamin diet did not benefit the rats' brains quantitatively, it appears to have had some effect on their chemical make-up, for the nitrogen content of the excess-vitamin rats' brains was noticeably higher than that of the brains of their brothers kept on a "normal" diet.

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Morphine Causes Upsets

Physiology

The physiological reason for the physical and mental misery of a morphine addict when he is suddenly deprived of his "dope" has been sought by a group of Louisville physiologists, who reported on their experiments before the meeting of the Thirteenth International Physiological Congress. The group consists of Doctors H. G. Barbour, B. E. Russel, S. H. Flowers, E. S. Dunham and L. G. Hunter.

An animal to which enough morphine has been administered to make its condition comparable to that of a human addict will have the water distribution in its tissues rather notably disturbed, Dr. Barbour said. There is less than the normal amount of water in the interior organs, such as the liver, kidneys and brain. Conversely, there is an increase in the water content in those organs through which contact is maintained with the outside world, such as the skin, stomach and intestines. The blood also suffers an increase in water content.

But when the accustomed daily doses of morphine were suddenly stopped, a remarkable redistribution of water in the body occurred. The blood, spleen and surface tissues all showed a loss, while the previously water-shy organs became edematous —that is, were gorged with water to an abnormal extent. The animals thus deprived developed trembling fits, a loss of calcium in the blood, disturbed temperature regulation and other physiological disturbances.

The experimenters regarded the edema of the brain—which might be roughly termed a condition of "water on the brain"—as especially significant, in that it might explain the psychological symptoms seen in morphine addicts who have been subjected to too sudden a "cure."

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Laboratory of Death

Physiology

An international organization for the experimental study of death was the proposal put before scientists attending the Thirteenth International Physiological Congress by Dr. Eusebio Adolpho Hernandez of Paris.

The idea was first suggested about a year ago by Prof. A. Kouliabko of Russia, who has made experiments on the human heart that survived 30 hours after death, Dr. Hernandez declared.

"Classical physiology has not approached the question of death in a methodical and direct fashion," he added. Some experiments have been made on the survival of isolated organs but, the physiologist pointed out, "the problem of death is not only the problem of conservation of life. It includes also the preservation of 'consciousness', that is to say, our 'associative memory' ".

It is necessary, he concluded, to coordinate the experiments already made to arrive at a control of the mechanisms of death.

"The experiments are important enough, also," he stated, "from the point of view of surgery and may possibly lead up to the site of origin of the causes of old age. Therefore, we need special centers for the physiological researches of experimental thanatology in which, without explaining the phenomena of life, we may prevent those of death."

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Bean Sauce Has Vitamin

Physiology

Don't scorn the humble bottle of soy bean sauce sitting beside the sugar bowl the next time you eat at a Chinese restaurant. Soy sauce aids digestion, Dr. A. A. Horvath of Princeton told members of the Thirteenth International Physiological Congress.

Soy sauce contains a number of ferments and other substances stimulating to the digestion of starches and protein and the absorption of food generally. The soy bean, which is a universal article of diet in China and other countries of the Orient, is the only seed which contains both water soluble and fat soluble vitamins, Dr. Horvath declared. It has the additional advantage, he pointed out, of containing a rather large proportion of the vitamin that promotes fertility.

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Increase Nerve Sensitivity

Physiology

Mercury injected into the system greatly increases the sensitivity of the autonomic nervous system, the webwork of nerves that controls a large part of the functions of the internal organs. This clue to the action of one of the most dangerous classes of poisonous compounds was supplied by Dr. William Salant of the Cold Spring Harbor Biological Station, who spoke before a meeting of the Thirteenth International Physiological Congress.

Dr. Salant administered doses of mercury salts to anesthetized cats, and tested the nerve action with a slight electric current. The sensitivity of the nerves increased progressively with additional doses up to a certain maximum, and then fell off again.

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Brain Injury and Rage

Physiology

The chronic and uncontrollable rage that is characteristic of some insane patients may be due to a direct mechanical injury to a certain tract in the base of the brain. Experiments on cats pointing in this direction were reported by J. F. Fulton and F. D. Ingraham, of Oxford University, speaking before the Thirteenth International Physiological Congress.

By surgical procedure under anesthesia, lesions were caused in the brain area under investigation. The cats recovered from the operation without difficulty, but they were changed cats. Gentle stroking, which before would send them into an ecstacy of pleased purring, now evoked only signs of the most violent cat-anger: spitting, biting, scratching, and tails like bottle-brushes.

Science News-Letter, August 24, 1929

Glands Take Kidneys' Job

Physiology

The elimination of certain poisons from the system, normally the task of the kidneys, can be imposed on the sweat glands of the skin when the kidneys are afflicted with nephritis, putting them out of commission. At the meeting of the Thirteenth International Physiological Congress Dr. Frederick M. Allen of Morristown, N. J., told of a dry heat treatment he has used on his patients to induce this health-restoring perspiration. Harmful protein compounds are reduced by this means, and abnormal conditions due to the presence of too much water in the body are corrected. Blood pressure is but little affected, but it is necessary to exercise a certain caution in administering the treatment to cardiac patients.

Science News-Letter, August 24, 1929

Over-Purified Rickets Cure

Physiology

Ergosterol, the stuff that gives certain fats and oils their power to prevent rickets when irradiated with ultra-violet light, has been split chemically into two related compounds. One of them retains the old name ergosterol, and the other is called isoergosterol. By highly refined chemical treatment the latter compound can be obtained in an extremely pure state. A mixture of ergosterol and isoergosterol exposed to ultra-violet light behaves in very much the same manner as natural ergosterol, so far as the spectroscope discloses; yet this synthetic mixture failed to prevent rickets in a group of experimental animals, according to a report presented before the Thirteenth International Physiological Congress. The experiments were performed by Doctors C. E. Bills, E. M. Honeywell, W. M. Cox, Jr., and A. M. Wirick, of Evansville, Indiana.

The experimenters conclude that a spectroscopic study of ergosterol can not yet be relied upon to give an index to the curative power of any given sample, but that experiments with animals must continue to be made.

They also found that the length of time needed to give ergosterol a certain curative strength varies according to the substance in which it is dissolved. Moreover, the solvent need not be transparent; arachis oil, the one used commercially, is not transparent yet permits a high degree of activation. A further discovery of the Indiana investigators is that activated ergosterol is remarkably non-poisonous. Quantities from 4,000 to 40,000 times as large as the therapeutic dose have been fed to rats before physiological disturbance resulted.

Science News-Letter, August 24, 1929

Starch for Diabetes

Physiology

The uncooked food idea may be elevated from its present low estate of a suspected fad to a position of real worth and dignity in the handling of diabetic patients, if the experiments of Dr. Sanford M. Rosenthal of Washington, D. C., are confirmed by further work. Dr. Rosenthal reported his researches before a meeting of the Thirteenth International Physiological Congress.

Dr. Rosenthal's statement, in part, was as follows:

"As a result of studies upon dogs and rabbits, it was found that the rate of digestion of raw starch, as measured by the increase in blood sugar, is markedly inhibited by acids. One cubic centimeter of 3.6 per cent. hydrochloric acid will almost completely prevent the intestinal digestion of raw starch for from one to three hours. This amount of acid does not affect the rise in blood sugar following glucose feeding.

"In humans similar findings were obtained with cooked starches. Cooked starches in man caused a rise in blood sugar as marked as though glucose were given. . . . but in nine normal adults 50 to 75 grams of raw starch caused no change in blood sugar.

"This principle was applied to diabetics and the starch was fed as such, or as raw carrots, turnips or nuts. The increase in blood sugar was much less than that ordinarily detected after a starch meal."

Science News-Letter, August 24, 1929

Bee Poisons Studied

Physiology

The use of living plants as laboratories in which various animal poisons may be differentiated by their effects on the plants was described by Dr. David I. Macht of the Johns Hopkins University before the Thirteenth International Physiological Congress.

Drugs of vegetable origin, he declared, are frequently more poisonous to animals than to plants and vice versa. A toxin discovered by Dr. Macht in the blood of pernicious anemia patients is not present in secondary anemia and similar blood disorders. The effect of this poison on plant seedlings has furnished a convenient diagnostic test for distinguishing pernicious anemia from related blood disturbances at certain stages of its development so that curative treatment can be started earlier than would overwise be possible.

A toxin just discovered in the blood of lepers, Dr. Macht stated, "serves to differentiate leprosy from blood sera of tuberculosis and syphilis and led to an important discovery in regard to its therapy.

"Further observations to be reported are on the blood of malaria, eclampsia sera, and on the extreme toxicity of certain animal poisons—of the toad, bee, ant, and particularly snake venoms."

Science News-Letter, August 24, 1929

Juice Aids Insulin

Physiology

It seems probable that the pancreas, which secretes insulin "internally" from certain patches of tissue known as the isles of Langerhans, also produces a substance with an insulin-like power to break down sugar, which passes through its duct as an "external" secretion into the digestive tract. This possibility was laid before the Thirteenth International Physiological Congress by Dr. W. N. Boldyreff of Battle Creek, Mich.

Earlier work by Dr. Boldyreff and others had shown that pancreatic juice has the power to split glucose, the sugar commonly present in the blood, producing lactic acid. And although the secretion of the pancreas is normally emptied into the intestine, it soon passes through the walls and is taken up by the blood, as experiments in the speaker's laboratory showed. There is, then, according to Dr. Boldyreff, no reason for assuming that the control of blood sugar is a function monopolized by insulin.

As a further check on the experiment, the "external" secretion of the pancreas was prevented from being discharged into the digestive tract of dogs by suitable surgical means. In each case the blood sugar of the animal increased, in spite of the fact that the "internal" secretion (insulin) was still being discharged into the blood from the isles of Langerhans.

Dr. Boldyreff is of the opinion that the external pancreatic secretion may serve as a valuable addition to insulin.

Science News-Letter, August 24, 1929

Grow Better on Meat

Physiology

Vegetarians who are heads of families would do well to look at the results of some growth experiments reported to the Thirteenth International Physiological Congress by Dr. Chi Che Wang, Bernice Huddlestun and Irving Graef of the University of Chicago.

This group of scientists has made two series of experiments on eight children between the ages of four to twelve years. In the first series the children received half the amount of protein or meat element in their diet that they had in the second.

"Metabolic studies showed," said Dr. Wang, "that without exception the rate of growth was more than doubled during the high protein period, the average gain being 82 grams per child per day as against 29 grams for the low protein diet."

Science News-Letter, August 24, 1929

New Process to Combat Fruit Fly

Entomology

Thanks to research scientists who have discovered a method of processing grapefruit, oranges and other fruit so that they can not harbor the dangerous Mediterranean fruit fly, the next citrus fruit crop of Florida will be able to move in commerce with perfect protection against spread of the pest to other states.

Since the new crop comes on the market in September, the newly perfected method of utilizing the cold storage and coloring processes and plants of Florida to render the whole fruit incapable of harboring the eggs and larvae of the dangerous pest is expected to relieve the financial situation that has developed in Florida as a result of the necessary quarantine enforced since the fruit fly was discovered four months ago.

The processing method that U. S. Department of Agriculture officials plan to substitute for the destruction of fruit that has been past practice was developed by federal research scientists. At present the full details of the method have not been announced, but it is said to be commercially feasible as well as effective in preventing all chance of a spread of the pest to other parts of the country. Heretofore Florida growers in the infested area, which produces 80 per cent. of Florida's fruit, have had only the prospect of destroyed fruit with only partial federal reimbursement for the loss involved. Now, while marketing will not proceed with the freedom of the pre-fruit-fly era, the crop can be sold and financial disaster will not loom..

When the committee of entomological experts sent by Secretary of Agriculture Hyde to study the fruit fly situation saw the possibilities of the processing method, they recommended that it be substituted for embargoes and destruction of suspected fruit in order that the fruit could be sold, the economic situation improved, cooperation from Florida growers maintained and costly reimbursements for destroyed fruits be avoided.

Though details of the proposed processing method have not been made known, it is known to be essentially an extension of the refrigerating and ripening processes that have hitherto been used by citrus shippers. The same equipment would be used. The cooling would be carried a little lower and the warming of the ripening or coloring process would be to a somewhat higher degree. This modification of the preparation of the fruit for market will kill all developing fruit flies that may be lurking within the fruit and make it perfectly safe.

This year's citrus crops would normally start moving in commerce in September and it is hoped that all of it, through the new processing method, can be placed on the market.

Four months ago, when the Mediterranean fruit fly was discovered to have invaded Florida, research entomologists were sent into the war zone with the entomological "shock troops" who destroyed infested fruit and held up shipments. They were quiet and unassuming warriors who set to work breeding and encouraging in cages the very fruit flies that their brother fighters were destroying. One of the first problems that they tackled was some way of making the citrus fruits safe for commerce even if at one time they had been infected. In the cold and heat treatment involved in the common commercial pre-cooling and coloring methods of pre-fruit-fly days they found the essence of the method that now promises to lift Florida out of the depths of its latest misfortune.

It was a matter of making the commercial methods more extreme. And now the processing of citrus fruits practically accomplished, the entomologists are turning toward the protection of other fruits, favorites of the fruit fly and grown in Florida's infested area.

Science News-Letter, August 24, 1929

Olympus Urged for Greek Park

Geography

Mount Olympus, majestic abode of the old Greek gods, may be turned into a typical twentieth century institution, a national park. Advocates of the national park idea in Greece are stressing both the esthetic and economic value to their nation in the creation of such a reservation. Since the national park has become a typically American institution, U. S. Park Service officials are pleased at the far-flung spread of a movement they foster.

The area proposed to be set aside would include the entire mass of Mount Olympus with its great crags, cascades, springs, grottos and venerable trees. The mountain which seemed to the ancient Greeks a fitting home for the deities that ruled their world, is still impressive in an age that has seen almost everything. From the shores of the Aegean Sea, the mountain mass rises to a height of almost 10,000 feet. Its highest peaks are snow-crowned during the greater part of the year.

In addition to Mount Olympus, the park area would include such historic points as the gorge of Tempe, the Byzantine fortress of Platamona, a beach strip, and the slope of Scotinas with the Callipeucian Forest. The park would be largely wilderness, comparable to the Great Smoky Mountains country in America.

In spite of the renown of Mount Olympus, the region is still almost unknown to all but the hardiest of explorers and mountaineers. The first known ascent of its highest peak was made in 1913 by two Swiss mountaineers. The following year an American and a Greek who was a naturalized American succeeded in making the climb.

Science News-Letter, August 24, 1929

Breed Mice in Colors

Heredity

"Colored Mice to Match Your Dresses" may be a popular fad some day if the predictions of Smith College Zoology students come true. Even now the members of one of the zoology classes will guarantee you mice of any one of five different shades.

The class has been concentrating on experiments on the inheritance of color. All mice are descended from ancestors of a single color, "agouti," or the grayish-brown which conceals them so well in the woods. By breeding it is possible to isolate the new color patterns in pure hereditary form and then to predict the proportions in which they will occur in the offspring. So when a student crosses a black mouse with a yellow mouse she is usally able to predict mathematically what color the young will be, and how many there will be of each color.

Sometimes, however, "mutations" occur. These are mice of a color different from that of either parent, whose offspring also will be of this new color.

Science News-Letter, August 24, 1929

Comet May Have Broken in Two

Astronomy

Discovery of a strange object in the sky close to Neujmin's comet by two astronomers of the Lick Observatory may show that this comet is breaking into pieces. The new object, as it is announced, since its cometary character is not yet established, is moving in the same direction as the comet, and is no farther away from it than the apparent diameter of the moon. However, it may be an asteroid, or tiny planet.

Dr. Charles J. Krieger and Dr. Nicholas T. Bobrovnikoff first located the new object. On Sunday evening, August 11, they observed the sky in the constellation of Aquarius to locate Neujmin's comet, which was found early in August. Their search revealed not only the comet, but a strange spot of light slightly to the south. Its position was then 21 hours 13 minutes 18.6 seconds right ascension and 13 degrees 37 minutes and 51 seconds south declination. A later observation the same evening showed it to be moving to the southwest, while on Monday night it was observed again, still farther to the southwest. In the meantime, Neujmin's comet was traveling along a similar direction a short distance to the north. However, on the night of discovery the strange object was of the fifteenth magnitude, while the next night it had faded to the sixteenth magnitude. Neujmin's comet was about a full magnitude brighter.

Should it turn out that the comet has broken into two parts, it will not be the first time that such a thing has happened. The most famous case was Biela's comet, first seen in 1772. This comet came back every six and a half years, though it was not observed on every return, until 1846, when it was found to have divided into two comets. In 1852 both parts were again seen, somewhat farther apart, but since then they have vanished entirely. However, meteor showers moving in the same path as the comet were observed on several occasions, the most notable of which occurred in 1872. These showed that the comet had broken up into a meteoric swarm. Perhaps something similar may be going on in Neujmin's comet.

Unfortunately, Neujmin's comet is far too faint to be seen except with a large telescope. The constellation of Aquarius, through which it is moving, is low in the southeast in August evenings.

Science News-Letter, August 24, 1929

Old Comet Still Seen

Astronomy

With the discovery, in Russia and in South Africa, of two new comets in the early days of August, there are three comets now in the sky within view of large telescopes. In addition to the new visitors, Stearns' Comet, discovered by Prof. C. L. Stearns, of Wesleyan University, Middletown, Conn., on March 10, 1927, can still be seen.

According to Prof. George Van Biesbroeck, of the Yerkes Observatory, this is probably the longest continuous observation ever made of a comet. A comet discovered in 1889 by the late Prof. E. E. Barnard, then at the Lick Observatory, was observed two years and seven months after its discovery. This, however, was a single isolated observation, and the comet had not been observed continuously.

Dr. Van Biesbroeck will report in the forthcoming issue of *Popular Astronomy* that he saw Stearns' Comet in July with the 40-inch telescope. Then it was of the 15th magnitude, extremely faint. It is now about 700 million miles away from the sun, or nearly as far from the sun as Saturn.

Despite its faintness, the comet can be located without great difficulty because it is keeping very close to the path predicted for it. The orbit of a comet can be calculated from three positions, but the farther apart the separate observations are, the more accurate is the orbit. As Stearns' Comet has been observed over such a long period, it is possible to use widely separated observations. The comet is also curious, because when it approached closest to the sun on March 22, 1927, it was more than 336 million miles away, or over three times as far as the earth. Only once in recent years has a comet that has been discovered at all kept so far away from the sun. That was Neujmin's Comet, discovered in 1914, which was about 342 million miles away from the sun when closest.

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Maya History in Opera

Archæology

The glory that once was Maya will reveal its ancient splendor again in a modern opera soon to be presented in Mexico City, under the patronage of the Ministry of Public Education.

The creator of the prehistoric drama is Don Luis Rosado Vega, the well-known Yucatecan poet and writer, and director of the Museum of History and Archeology in Merida.

The Maya title of the opera is Payambé, meaning "The First One", and is a colorful tale of wars between kings of Tuluum and Chichen Itza, complicated by amorous entanglements between a princess of Chichen and an enemy prince from Tuluum. One of the most stirring parts of the drama is worked out amid Maya witchcraft in the Caves of Loltun, or Caves of the "Stone Flowers", in Southern Yucatan.

The scenery for the opera has been painted by Juan G. Novelo, a Maya boy, the fame of whose talent has not yet gone far beyond the limits of the peninsula. The first scene is in the ancient city of Tuluum, now fortress-like ruins on the almost unknown coast of Quinatana Roo, which turn their white shoulders on the Caribbean Sea. The artist visualizes the city as it once was, its temples and palaces on the lofty terraces facing inland, while the emerald sea and the blue skies are its background.

The second scene is in Chacmultun, today a ruined city not far from the modern town of Tecax. The third scene represents the limestone Caves of Loltun, near the modern village of Oxkutzcab, famous today for mysterious carvings left by the Mayas in the natural underground caverns and passages. The last scene pictures Chichen Itza, and features the Temple of the Warriors recently restored by the Carnegie Institution expedition into Yucatan.

The music of the opera is by Fausto Piñedo, a Yucatecan composer. There will be dances and ritual scenes with ancient Maya costumes and music. *Science News-Letter, August 24, 1929*

Acid Cause of Anemia

Physiology

A possible connection between anemia and one type of "stomach trouble" was pointed out to members of the Thirteenth International Physiological Congress by Dr. W. N. Boldyreff of Battle Creek Mich. It is one of the best known of physiological facts that the juices of the stomach are highly acid, while those of the small intestines are less acid and finally alkaline. It is also known that red blood cells are destroyed by acid; this fact was established by experiments in test tubes, but had never been confirmed by observations on living animals. The possible connection suggested itself to Dr. Boldyreff, and he induced his associate, Ephraim Boldyreff, to make tests in his laboratory.

Acids were introduced into various parts of the digestive tracts of several dogs over a period of some weeks. In all cases it was apparent that the acids were being absorbed through the intestines into the blood stream, and the count of red blood cells fell off markedly, giving rise to a condition resembling pernicious anemia. When the acid was no longer administered, the blood of the dogs returned to normal after a few weeks.

Science News-Letter, August 24, 1929

Drugs Affect Rats

Physiology

Dr. Walter R. Miles of Stanford University wanted to study the effect of different drugs on the whole animal body in contrast with many recent biological experiments with drugs on separate muscles and organs. So he trained some laboratory rats to run through a complicated maze to reach their food.

After about a month, when he thought they were letter perfect, according to an account of his procedure presented at the Thirteenth International Physiological Congress, he tried the effect of injecting small quantities of different drugs just before his rats were ready for a meal.

Alcohol made locomotion difficult, but the rats still knew how to find their nourishment. John Barleycorn had no effect, at least in laboratory doses, on memory; but the rats couldn't walk straight. Another drug, hyoscine, a rather powerful depressant sometimes used for insomnia, produced just the opposite effect. They could walk perfectly but could not remember where to go and acted as if they were exploring the maze for the first time.

"No drug yet tried," said Dr. Miles, "has been found to produce a performance which is an improvement on the normal."

Science News-Letter, August 24, 1929

Planes Cross Canyon

Aviation

The north and south rims of the Grand Canyon of the Colorado are now spanned by a scheduled passenger transportation line that for the first time in history betters the two-day time of the mule-back trip down into and across the canyon which heretofore has been the only regular means of crossing the canyon directly.

Airplanes made the trip in thirty minutes flying time. Propelled by three 550-horsepower motors, the fifteen-passenger airplanes are using a natural field in the Kaibab forest, 8000 feet in altitude, claimed to be the highest regularly used airport in the world. It is often necessary to scare herds of deer off the field before the airplanes can be landed.

From the south rim, 7000 feet in altitude, the airplane rises another 3000 to 4000 feet in order that the great chasm, over a mile deep, can be traversed safely. An emergency landing field on one of the great terraces in the canyon's depths has been cleared and a test landing made.

In addition to serving as a quick means of transportation for those desiring to travel directly southward or northward between Salt Lake City and other areas north of the canyon and southern Arizona, previously a two-day roundabout rail trip, one day or one afternoon excursions from one rim to the other and return have been added to side-trips possible from either rim of the canyon.

Automobilists can pass from rim to rim over a circuitous route and merely passable roads via the new Lee's Ferry Bridge, but this requires at least two days.

Scenic airplane trips over the Grand Canyon from the south rim have been available for over a year, but the first landing of the passenger airplanes on the north rim was made this summer. The regularly scheduled air line across the canyon has just been placed in operation.

The first airplane flight over the canyon was made by an army officer, Lieut. Alexander Pearson, on June 10, 1921.

Traversing the canyon by airplane costs approximately two-thirds as much as crossing on mule back.

Science News-Letter, August 24, 1929

With the establishment of the Grand Teton National Park, Wyoming, and the Bryce Canyon National Park, Utah, during the past year there are now 21 members of the national park system.

Irish and Armenians Kin?

Ethnology

Are Irishmen and Armenians racial cousins? They are, asserts Prof. N. Marr, member of the Russian Academy of Sciences, and he links into the cousinship a third people, the Scythians, who were among the toughest fighters known to antiquity.

The Irish cousins of these Asiatic peoples do not include all of the present inhabitants of Ireland, Prof. Marr explains, but only those who are descended from the earliest known dwellers in the island.

The Russian ethnologist bases his theory on a study of words and their origins. "Ulut" was the tribe-name of these very early Irishmen, and "in tempore ulutorum", meaning "in the time of the uluts", is a phrase much favored by early Irish chroniclers to indicate the "furthest back" in Irish history. According to Prof. Erin MacNeyll, student of Irish antiquities, St. Patrick began his missionary work in the Ulidian country, and the earliest known written Irish epic and historic literature is also Ulidian.

The base of the word "Ulidian" is "ulid" or "ulit". Prof. Marr believes that the name the Scythians called themselves, "Skolot", is a modification of these two syllables. And in the Caucasus he has found the word again, as in the district and town of Olti, known in antiquity as Ulti. The ancestors of the Armenians called themselves "Uti".

All the tribes that called themselves by this name in its various modifications must have had a fair degree of self-esteem, for the primitive root "ud", according to Prof. Marr, means "children of Heaven".

Science News-Letter, August 24, 1929

Peace and Plenty Through Science

General Science

JOHN JOSEPH CARTY in an introduction to *Research Narratives, Vol. III* (Engineering Foundation).

The progress of scientific research in our country depends in the last analysis upon the support which it receives from the public. There is no lack of problems to be solved, all of which in one way or another affect the welfare of the nation, and there will be no lack of competent scientific investigators who will solve them if the necessary financial support is provided.

It is sometimes instructive to appraise the value of scientific research in pecuniary terms. For example, take the very great improvements in electric power and electric lighting which have been made by the industrial scientists during the past twenty-five years. Were it not for these improvements the bill which the public is now paying for electric current would be greater by more than *two billion dollars* a year. A similar story could be told of the results of scientific research conducted in the telephone industry and in the chemical and metallurgical industries.

But the higher values of scientific research must be stated in terms of human achievement, the elimination of poverty and disease, the advancement of learning, the growth of right living and good understanding among men. Scientific research is indispensable to the attainment of all of these ends.

According to the vision of Science, life must no longer be regarded as a struggle among men for a limited store where one man's gain or one nation's gain must be another's loss. Under the banner of scientific research we are asked to join with our fellow-men working together in controlling and utilizing the boundless forces of Nature. . . .

American business and commerce and industry and the American public should be urged to give to scientific research in our universities and elsewhere that support which it so greatly needs. "Science," said the great Pasteur, "is the soul of the prosperity of nations and the living source of all progress." For all of the benefits which it confers upon us, Science asks only that we provide its zealous workers with the opportunity to multiply their efforts in our behalf.

Science News-Letter, August 24, 1929

Cornell home economics experts point out that space may be saved when packing by putting rubbers on shoes.

The U. S. Department of Agriculture is to make talking movies to demonstrate good and bad farming methods.

One of the fossil dragon flies, representing a prehistoric form of life, has a wing spread of more than two feet.

Chemical Cantos

Chemistry

THOMAS STEPHENSON in *Industrial and Engineering Chemistry* (News Edition):

Sam put $AgNO_3$ in ma's perfumery,
Thinking he would make a hit if he strengthened it a bit
Now each morning little Sammy goes to greet his Coal Black Mammy.

Johnny, feeling life a bore, drank some H_2SO_4;
So his father, an M.D., gave him $CaCO_3$.
Johnny's neutralized, it's true, but he's full of CO_2.

Maudie was delighted when she found a lump of KCN.
"Daddy's fond of sweets," said she, as she dropped it in his tea.
Father drank it; that is how Maud's mamma's a widow now.

Tommy, eager to explore, found some $CuSO_4$.
"Nice rock candy," Tommy cried as he jammed a lump inside.
Doctor pumped him out, it's true, but Tommy still feels rather blue.

Bobbie, in his careless glee, mixed some I with NH_3.
When the stuff was dry and thick, Bobbie hit it with a brick.
Bobbie's now in heaven they say; at least he seemed to go that way.

Auntie Jane gave Baby Sue a dose of $HgCl_2$.
Baby's with the angels now, and Auntie Jane is wond'ring how
A single atom of Cl can make such change in calomel.

Science News-Letter, August 24, 1929

Monkeys Poor Geometrists

Animal Psychology

Monkeys can be taught the difference between the shapes of things, but they have a hard time distinguishing between pictures of the same objects. Dr. J. A. Bierens de Haan, a Dutch student of animal intelligence, reports that he was able to teach two monkeys to distinguish readily between cubes and cones. But when he showed them pictures of the cubes and cones, one of the two fell down completely, though the other, a monkey of different species, apparently made the right choice intelligently at least part of the time.

Science News-Letter, August 24, 1929

Hindu surgeons in early times used more than 100 different surgical instruments and performed difficult operations.

First Glances at New Books

PSYCHOLOGY OF LEARNING APPLIED TO HEALTH EDUCATION THROUGH BIOLOGY—Anita Duncan Laton—*Teachers College, Columbia University* ($1.50). Teaching in the light of the newer psychological methods was tested by Dr. Laton's experiments reported in this study. One class of ninth-graders being presented information about diseases was made to realize that these diseases vitally concerned themselves. They were given current health reports and allowed to visualize the romantic history of the growth of medicine. The control class was taught in the conventional manner and not encouraged to stray beyond the textbok. The newer technique produced the best results.

Education
Science News-Letter, August 24, 1929

SCENARIO WRITING—Marion Norris Gleason—*American Photographic Publishing Company* ($3). Thanks to 16 mm. film and amateur movie cameras, anyone who has the patience, the money, and the proper hankering, can get into the movies. In view of the movies all going sound, there is incentive for the growth of home movie-making guilds that use backyards for studios and neighbors for cast. This book, with a foreword by Dr. C. E. Kenneth Mees, who might be called the father of amateur movies, tells how to roll your own movies.

Cinematography
Science News-Letter, August 24, 1929

REPORT III TO THE PRESIDENT OF THE UNITED STATES — Federal Oil Conservation Board—*Government Printing Office* (30c). A fundamental document in the proper utilization of one of the world's most important raw materials.

Chemistry—Geology
Science News-Letter, August 24, 1929

CONTRIBUTION TO THE COMPARATIVE ANATOMY OF THE EARED AND EARLESS SEALS—A. Brazier Howell—*Government Printing Office*. An anatomical study of seals of interest chiefly to specialists and students in this branch of zoology.

Mammalogy
Science News-Letter, August 24, 1929

SCIENCE AND PROGRESS IN THE INDUSTRIES — John J. Carty — *National Research Council* (20c). A spoken essay on the relation between science and industry here reprinted in order that it may achieve wider influence and permanence.

General Science
Science News-Letter, August 24, 1929

EXPLORATIONS IN CENTRAL ANATOLIA—H. H. Von der Osten—*University of Chicago* ($4). This is an account of the expedition in 1926 to Anatolia, in Asia Minor, sent by the Oriental Institute of the University of Chicago. This expedition was a preliminary one with the purpose of locating archæological remains of the great Hittite Empire. Other expeditions are expected to follow to make detailed studies on the locations which this one mapped out. The book is abundantly illustrated and should be especially stimulating to archæologists and those who follow their trails.

Archæology
Science News-Letter, August 24, 1929

ANNUAL REPORT OF BUREAU OF AMERICAN ETHNOLOGY, 1926-7—*Government Printing Office*—($2.25) This report of the government bureau for investigating the past of America's native race is chiefly interesting because of the four archæological and ethnological studies that accompany it.

Archæology—Ethnology
Science News-Letter, August 24, 1929

HEREDITY AND PARENTHOOD—Samuel C. Schmucker—*Macmillan* ($2.50). The facts of heredity and sex are explained and traced from the lowest animals to man. Dr. Schmucker also discusses with examples from life the sometimes difficult relationships in which sex involves us.

Biology
Science News-Letter, August 24, 1929

THE CHILD'S HEREDITY—Paul Popenoe—*Williams and Wilkins* ($2). Recent developments in child research put into readable form for the benefit of the average parent.

Heredity
Science News-Letter, August 24, 1929

BIBLIOGRAPHY OF BIBLIOGRAPHIES ON CHEMISTRY AND CHEMICAL TECHNOLOGY, FIRST SUPPLEMENT — Clarence J. West and D. D. Berolzheimer—*National Research Council* ($1.50). Bibliography of bibliographies is reminiscent of the essence of the quintescence. But with the wide spread of scientific publication today and the lack of an all-inclusive, omniscient, omnipotent and omnipresent central bureau for the organization of scientific knowledge, such indices of indices, to which this is the first supplement, are very necessary. Properly used, these compilations will save much effort on the part of the research scientist.

Chemistry
Science News-Letter, August 24, 1929

NATURE RAMBLINGS

By FRANK THONE

Mountain Goat

Solomon is on record somewhere as saying that he got quite a kick out of seeing "an he goat upon a rock". Of course, he didn't use such undignified slang—it hadn't been invented in his day—but that is about what he meant.

Solomon was a king, and born to the purple. But the business of ruling over Israel hadn't been in his family very long; his father, David, started out as a farm boy. And it is not unlikely that in a pastoral nation such as Solomon's, where the cities were all small and the rugged hills never far away, a philosopher-monarch with a taste for natural history would have plenty of chances to see a dignified four-footed animal analogue of himself, ruling majestically over a kingdom of lofty rocks.

It is bit of a pity that Solomon is separated from western America by so many miles of land and water and by so many lapsed centuries. Our western mountain goat would be good for a handful of crisp verses in Proverbs any day, if that book were in the writing now. He is a serious creature, sober in his gait—nothing capricious about him. He lives in a world where "watch your step" is the price of continued existence. How he picks up a living from a few sparse wisps of grass among the dizzy pinnacles where he makes his home is one of the continuing marvels of zoology.

The mountain goat is strictly an animal of the north and of the snows. Even in the Rockies he doesn't range southward. Only two of the national parks in the United States proper have goats: Glacier and Rainier, and these are the farthest north of the national park system. But up in Canada, and on into Alaska, he is found abundantly.

Science News-Letter, August 24, 1929

The birth-rates in England, Germany and Sweden are lower than that in France.

Dryness Brings Spider Pest

Entomology

The prolonged dry weather in the East has proved highly favorable to destructive work by the small red spider, which has developed in enormous numbers upon various plants, such as garden phlox, apple trees and oak leaves, according to information obtained at the Bartlett Tree Research Laboratories at Stamford, Conn.

The depredations of these spiders produce in each case a somewhat characteristic yellowish or grayish spotted discoloration, usually small. It was stated that a continuance of the dry weather would probably produce additionally large numbers of spiders and that serious injury to foliage would result, as badly discolored leaves cannot function properly. The evergreens, such as red cedars, are likely to be affected by the spider.

Experiments now in progress show that atomic sulfur used at the rate of five pounds to fifty gallons of water is a satisfactory spray, provided all of the leaf surfaces are covered. In the case of the phlox the under side of the leaves should be sprayed.

Science News-Letter, August 24, 1929

Test Finds Right Milk

Physiology

New hope for bottle babies was held out by Dr. Reuben L. Hill, nutrition expert of Logan, Utah, at the Thirteenth International Psysiological Congress.

Dr. Hill has developed a test at the Utah State Experiment Station by which the toughness of the curd formed by the normal coagulation of milk can be measured. There is reason to believe, he declared, that this quality of toughness in milk curds is a more important factor in choosing baby's milk than the fat content, previously the item most stressed in picking out suitable infants' food.

Not more than ten per cent. of cows, according to the tests made by the Utah doctor, give milk curds soft enough for delicate babies to digest. By the use of the new curd test it is possible to find cow's milk that closely approximates mother's milk, an invaluable asset for young and sickly babies that have to be fed by a bottle. Such milk, he added, when fed to infants, requires little if any modification or dilution, a condition that does away with the troublesome mixing of the complicated formula on which many modern babies get their start in life.

Science News-Letter, August 24, 1929

Control Chemical Growth

Botany

A plant's speed or slowness in producing flowers and seed depend on internal chemical adjustments, which in turn may be controlled by changing the conditions under which the plant grows, in the opinion of Prof. N. A. Maximov of the Russian Institute of Applied Botany. Prof. Maximov has lately duplicated by chemical manipulation the results obtained by himself with temperature control, and by the American workers, W. W. Garner and H. A. Allard, in shifting the flowering and fruiting times of plants.

It is Prof. Maximov's theory that there is in plants an antagonism between vegetative growth, producing stems and leaves, and reproductive growth, which results in flowers and fruits. What encourages one discourages the other. Some plants, moreover, have a tendency to run strongly to vegetative growth, and only some kind of a physical jolt will drive them into reproductive activity.

The general condition which causes plants to vegetate instead of reproducing is a high carbohydrate ratio in their make-up; high nitrogen content drives them into bloom. Prof. Maximov held natural early bloomers in the vegetative condition for a long period by cutting down their supply of nitrogen fertilizers, and he forced natural late bloomers into precocious flowering by giving them a superabundance of this element.

Science News-Letter, August 24, 1929

Baby Mice Grow Into Giants

Physiology

Gigantic mice, developed by allowing baby mice to be nursed by rats, have been grown as a result of an experiment recalling H. G. Wells' famous story, "The Food of the Gods." Dr. A. S. Parkes, working as Belt Memorial Research Fellow at University College in London, is the experimenter who has obtained these remarkable results.

In previous researches Dr. Parkes had shown that among normally suckled mice, members of small litters grew much faster than those from large litters. He explained this fact on the assumption that the amount of nutrition available was about the same for all litters no matter what their size, so that the nutrition available for each individual young mouse was less the larger the litter. In order to test this explanation he attempted successfully the unnatural experiment of foster-mothering young mice with mother rats.

"The manoeuvre required much care in selecting docile rats, etc., and even when the mice were not eaten, many difficulties arose, such as the weight of the rat when lying on the young mice," explained Dr. Parkes. He was rewarded for his perseverance by having his explanation completely confirmed by the results, for size of the litter had no effect on rate or weight increase when the mice available had the comparatively unlimited nutrition supplied by the mother rat's milk. His much pampered rat-suckled mice became of comparatively elephantine size. At weaning time they each weighed as much as a full-grown mouse; but, like humans, they paid the penalty for their enormous bulk by losing mobility.

"This great increase in size, however, did not cause a corresponding increase in development," he said. "The eyes, for instance, opened at the normal time—13 days old, and the animals at 3 weeks old were practically immobile owing to failure of the immature frame to cope with a weight almost equal to that of the adult animal. . . . Under conditions of unlimited nutrition the growth of young mice may proceed to a degree which is both unusual and unhealthy."

Science News-Letter, August 24, 1929

Overspeed Test Pit

Engineering

Our cover this week, reproduced by courtesy of the General Electric Company, from a painting by Mott Smith, shows the installation of a water-wheel generator rotor in the Company's test pit preparatory to giving it an overspeed test. As such a test may smash a rotor, and liberate a tremendous amount of energy, the pit is built stronger than the heaviest bridge or building.

The inner wall is of concrete three feet thick and reinforced with one-inch steel bars closely woven together. Surrounding this wall is a seven-foot cushion of closely packed sand, and around that another wall of reinforced concrete four feet thick. The steel lid, four feet thick, constructed of a steel plate on a braced I-beam skeleton, prevents the pot from "boiling over." Instruments in the pit permit the observers outside to check everything that happens until a smash actually occurs.

Science News-Letter, August 24, 1929

CLASSIC INVENTIONS:

Of the Seed as Vegetating

Botany

THE ANATOMY OF VEGETABLES BEGUN. With a General Account of Vegetation Founded thereon. By Nehemiah Grew, M. D., and Fellow of the Royal Society. London, 1672.

One of the first experiments performed by young botanists of the present day (usually in the kindergarten years) is this of Grew's watching the growth of the "great Garden-Bean" as it pushes up its two "Dissimilar Leaves". Because he was one of the pioneers of botany, much of Grew's work has been superseded, but his advice is today as good as ever: *"Those that shall think fit to examine, as well as to peruse these Observations, we advertise them,* First, *That they begin, and so proceed till they end again, with the Seed: For they will hardly be able to avoid Errour and Misapprehension, if either partial or preposterous in their Enquiries.* Next, *That they confine not their Enquiries to one time of the Year; but to make them in several Seasons, wherein the Parts of a* Vegetable *may be seen in their several Estates.* And then, *That they neglect not the comparative* Anatomy; *for as some things are better seen in one estate, so in one* Vegetable, *than another."*

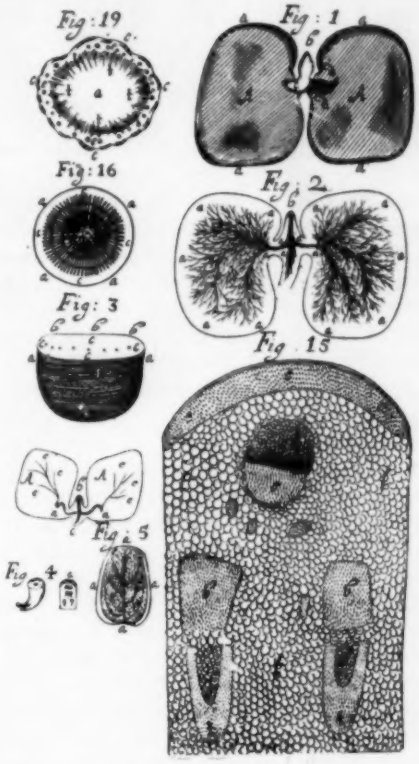
The Garden-Bean Dissected

Being to speak of Vegetables; and, as far as Inspection and consequent Reason may conduct, to enquire into the visible Constitutions and Uses of their several Parts; I chuse that Method which may with best advantage suit to what we have to say hereon: And that is the Method of Nature her self, in her continued Series of Vegetations, proceeding from the Seed sown, to the formation of the Root, Trunk, Branch, Leaf, Flower, Fruit, and last of all, of the Seed also to be sown again; all which we shall in the same order particularly speak of.

The Essential Constitutions of the said Parts are in all Vegetables the same: But for Observation, some are more convenient; in which I shall chiefly instance. And first of all, for the Seed we chuse the great Garden-Bean.

If we take a Bean then and dissect it, we shall find it cloathed with a double Vest or Coat: These Coats, while the Bean is yet green, are separable, and easily distinguished. When 'tis dry, they cleave so closely together, that the Eye, not before instructed, will judge them but one; the inner Coat likewise (which is of the most rare contexture) so far shrinking up, as to seem only the roughness of the outer, somewhat resembling Wafers under *Maquaroons.*

At the thicker end of the Bean, in the outer Coat, a very small *Foramen* presents it self: In dissection 'tis found to terminate against the point of that part which I call the Radicle, whereof I shall presently speak. It is of that capacity as to admit a small Virginal Wyer, and is most conspicuous in a green Bean. . . .



The Radicle Distinguish'd

This part is not only in the Bean, and the Seeds above mentioned; but in all others: being that which upon the Vegetation of the Seed, becomes the Root of the Plant; which therefore I call the *Radicle*: by which, I mean the Materials, abating the Formality, of a Root. 'Tis not easie to be observed, saving in some few Seeds, amongst which, that of the Bean is the most fair and ample of all I have seen; but that of some other Seeds, is, in proportion, greater; as of Fœnugreek, which is almost as big as one of its Lobes.

The lesser of the two said Appendents lies occult between the two Lobes of the Bean, by separation whereof only it is to be seen. 'Tis enclos'd in two small Cavities form'd in the Lobes for its reception. Its color comes near that of the *Radicle;* and is founded upon the Basis thereof, having a quite contrary production, *sc.* towards the cone of the Bean; and being that very part, which, in process, becomes the Body or Trunk of the Vegetable. See *Fig.* 1.

For the sake of this Part principally it is, that the Bean is divided into Lobes; *sc.* that it may be warmly and safely lodged up between them; and so secur'd from the Injuries so tender a part would sustain from the Mould, whereto, had the Main Body been entire, it must have lain contiguous.

This Part is not, like the *Radicle,* an entire Body, but divided at its loose end into divers pieces, all very close set together, as Feathers in a Bunch; for which reason it may be called the *Plume.* They are so close, that only two or three of the outmost are at first seen: but upon a nice and curious separation of these, the more interiour still may be discovered. Now as the *Plume* is that Part which becomes the Trunk of the Plant, so these pieces are so many true, and already formed, though not displayed, Leaves, intended for the said Trunk, and founded up in the same plicature, wherein, upon the sprouting of the Bean, they afterwards appear. In a French Bean, the two outmost are very fair and elegant. In the great Garden-Bean, two extraordinary small Plumes, often, if not always, stand one on either side the great one now describ'd: From which, in that they differ in nothing save in their size, I therefore only here just take notice of them. And these three Parts, *sc.* the *Main Body,* (*Turn to next page*)

Thyroid and Goiter Danger

Physiology

The thyroid, that very important gland in the throat whose pathologic enlargement we recognize as goiter, is not proportionately larger in females than in males, although a popular impression to that effect has long prevailed. Careful measurements of the thyroids of hundreds of ringdoves and pigeons has shown the contrary, Dr. Oscar Riddle of the Carnegie Institution of Washington reported to members of the Thirteenth International Physiological Congress.

There is a hereditary difference in thyroid size, some strains of birds showing consistently larger glands generation after generation. There is also considerable variability in thyroid size in any given strain, but the variability is much greater in strains with large thyroids than in those with small. In general, the tendency to develop abnormal thyroid size, known in humans as goiter, is more marked in females than in males. This agrees with the condition found in the human species, for women are afflicted with goiter more often than men are.

Grew on the Seeds As Vegetating—*Continued*

the *Radicle*, and the *Plume*, are concurrent to the making up of every Seed; and no more than these.

Having thus taken a view of the Organical Parts of the Bean, let us next examine the Similary, *sc.* those whereof the Organical are compos'd: a distinct observation of which, for a clear understanding of the Vegetation of the Seed, and of the whole Plant arising thence, is requisite: To obtain which, we must proceed in our Anatomy.

The Cuticle Described

Dissecting a Bean then, the first Part occuring is its Cuticle. The Eye and first Thoughts suggest it to be only a more dense and glossy Superficies; but better enquiry discovers it a real Cuticle. 'Tis so exquisitely thin, and for the most part so firmly continuous with the Body of the Bean, that it cannot, except in some small Rag, be distinctly seen; which, by carrying your Knife superficially into the Bean, and then very gently bearing upward what you have cut, will separate and shew itself transparent. This Cuticle is not only spread upon the Convex of the Lobes, but also on their Flats, where they are contiguous, extending it self likewise upon both the *Radicle* and *Plume*, and so over the whole Bean.

This Part, though it be so far common with the Coats of the Bean, as to be like those, an Integument; yet are we in a quite different Notion to conceive of it: For whereas the Coats upon setting the Bean, do only administer the Sap, and, as being superseded from their Office, then die; as shall be seen: this, on the contrary, with the Organical Parts of the Bean, is nourished, augmented, and by a real Vegetation co-extended.

Next to the Cuticle, we come to the *Parenchyma* it self; the Part throughout which *the inner Body*, whereof we shall speak anon, is disseminated; for which reason I call it the *Parenchyma*. The Surface hereof is somewhat dense, but inwardly 'tis more porous, and of a laxer Contexture. . . .

The Inner Body

By what hath been said, that the *Parenchyma* is not the only constituting Part, besides the Cuticle, is imply'd: there being another Body, of an essentially different substance, embosom'd herein: which may be found, not only in the *Radicle* and *Plume*, but also in the Lobes themselves, and so in the whole Bean. . . .

For this inner Body, as it is existent in every Organical part of the Bean; so is it, with respect to each part, most regularly distributed. In a good part of the *Radicle* 'tis one entire Trunk; towards the Basis thereof, 'tis divided into three main Branches; the middlemost runneth directly into the Plume; the other two on either side it, after a little space, pass into the Lobes; where the said Branches dividing themselves into more, and smaller; and those into more, and smaller again, are terminated towards the Verges of each Lobe; in which manner the said inner Body being distributed, it becomes in each Lobe, a true and perfect Root.

This Seminal Root, as now we'll call it, being so tender, cannot be perfectly excarnated, as may the Vessels in the Parts of an Animal, by the most accurate Hand; yet by dissection begun and continu'd, as is above-declared, its whole frame and distribution may be easily observ'd. Again, if you take the Lobe of a Bean, and lengthwise pare off its *Parenchyma* by degrees, and in very thin Shives, many Branches of the Seminal Root, (which by the other way of Dissection were only noted by so many Specks) both as they are fewer about the Basis of the Bean, and more numerous towards its Verges, in some good distinction and entireness will appear. For this you must have new Beans. . . .

In the mean time, let us only take notice, that we say every Plant hath its Root, we reckon short; for every Plant hath really two, although not contemporary, yet successive Roots; its Original or *Seminal-Root* within its Seed, and its *Plant-Root*, which the *Radicle* becometh in its growth: the *Parenchyma* of the Seed being in some resemblance, that to the *Seminal Root* at first, which the Mould is to the *Plant-Root* afterwards; and the *Seminal Root* being that to the *Plant-Root*, which the *Plant-Root* is to the *Trunk*. . . .

Lobes Turn into Dissimilar Leaves

Excepting a few of these two kinds, all other Seeds whatsoever, (which I have observed) besides that they continue firm, upon the Vegetation of the *Plume*, mount also upwards, and advance above the Mould together with it, as all Seeds which spring up with dissimilar Leaves; the two (for the most part two) dissimilar Leaves, being the very Lobes of the Seed divided, expanded, and thus advanced.

The Impediments of our apprehension hereof as the Colour, Size and Shape of the dissimilar Leaves. Notwithstanding, that they are nothing else but the main body of the Seed, how I came first to phansie, and afterwards to know it, was thus: First, I observed in general that the dissimilar Leaves were never jagg'd, but even edg'd: And seeing the even verges of the Lobes of the Seed hereto respondent, I was apt to think, that those which were so like, might prove the same. Next descending to particular Seeds, I observed first of the *Lupine;* that as to its Colour, upon its advance above the Mould, it ever changed into a perfect Green. And why might not the same by parity of Reason be inferr'd of other Seeds? That, as to its size, it grew but little bigger than when first set. Whence, as I discern'd (the Augmentation being but little) we here had only the two Lobes: So, (as some augmentation there was) I inferr'd the like might be, and that, in farther degrees, in other Seeds. . . . From all which, and the observation of other Seeds, I at last found, that the dissimilar Leaves of a young Plant, are nothing else but the Lobes or *main Body* of its Seed: So that as the Lobes did at first feed and impregnate the *Radicle* into a *perfect Root;* so the *Root* being perfected, doth again feed, and by degrees amplifie each Lobe into a perfect Leaf. . . .

The use of the dissimilar Leaves is, first, for the protection of the *Plume;* which being but young, and so but soft and tender, is provided with these, as a double Guard, one on either side of it. For this reason it is, that the *Plume* in Corn is trussed up within a membranous sheath; and that of a *Bean*, cooped up betwixt a pair of *Surfoyles;* but where the Lobes rise, there the *Plume* hath neither of them, being both needless.

Nehemiah Grew (1641-1712) studied medicine at Cambridge. He began his observations of plants at the age of 23, and wrote his "Anatomy of Vegetables Begun" during the next six years. The title was prophetic, for that small book eventually became the first part of his larger work, "Anatomy of Plants", published when the author was 41. Grew was identified with the Royal Society during its formative period. He became a Fellow at the age of 30, following the publication of the "Anatomy of Vegetables Begun". At 36 he became its Secretary, and for the two following years edited ist "Philosophical Transactions".